Claims:

1. An optical filter including a substrate (60) having a plurality of layers (50) of materials stacked upon it each of which layers is formed from one or both of:

a first material (H) having a first index of refraction; and,

a second material (L) having a second index of refraction being less than the first index of refraction;

wherein the plurality of layers of materials include a first layer and a second layer each and a third layer formed from the first material (H) being stacked in between the first layer and the second layer;

wherein the optical thickness of each of said first and said second layers is greater than the optical thickness of said third layer,

characterized in that the first layer and second layers are each formed from an inhomogeneous mixture (M) of said first material (H) and said second material (L), in that the optical thickness of said first layer and of said second layer each differ in magnitude from the value 2Q by less than Q/2, and the optical thickness of said third layer differs in

magnitude from the value Q by less than Q/2, where Q is the thickness of a given said layer traversed by substantially one quarter of a wavelength of optical radiation of a common reference wavelength at which said optical thicknesses are determined, and in that all variations in the index of refraction (21 or 25 or 27 ; 23 or 26 or 28) of the first and second layer increase that index of refraction as the depth of the respective layer increases from regions thereof remote from said third layer to regions thereof proximate the third layer.

2. An optical filter according to Claim 1 wherein the optical thickness of said first layer is substantially equal to the optical thickness of said second layer.

3. An optical filter according to Claim 1 wherein the optical thickness of said first layer and of said second layer are each substantially equal to 2Q, and the optical thickness of said third layer is substantially equal to Q.

4. An optical filter according to any of preceding claims 1 to 3 wherein said plurality of layers of materials include a pair of outer layers each being

formed from said second material (L) and between which are stacked said first, second and third layers.

5. An optical filter according to Claim 4 wherein the optical thickness of each of said pair of outer layers differs in value from the magnitude Q by less than Q/2.

6. An optical filter according to Claim 4 or 5 wherein the optical thickness of each one of the pair of outer layers is substantially equal to the optical thickness of the other of the pair.

7. An optical filter according to Claim 6 wherein the optical thickness of each of the outer layers is substantially equal to Q.

8. An optical filter according to any preceding claim wherein the index of refraction (21 or 25 ; 23 or 26) of the first and/or second layer varies continuously through at least a part of the depth of the respective layer.

9. An optical filter according to any preceding claim wherein the index of refraction (25 or 27 ; 26 or

28) of the first and/or second layer varies substantially in a step-wise manner through at least a part of the depth of the respective layer.

10. An optical filter according to any of preceding claims 1 to 7 and 9 wherein all variations in the index of refraction (25 or 27 ; 26 or 28) of the first and/or second layer occur substantially in a step-wise manner.

11. An optical filter according to Claim 9 or Claim 10 wherein the first and/or second layer comprises a plurality of sub-regions stacked therein each of which is formed from a homogeneous mixture of the first material (H) and the second material (L) whereby the homogeneous mixture forming any one sub-region differs from the homogeneous mixture forming immediately neighbouring sub-region(s) within the first and/or second layer such that the index of refraction of each of the plurality of sub-regions is substantially constant with the depth of the sub-regions and the index of refraction of the first and/or second layer varies substantially step-wise with depth between successive sub-regions thereof.

12. An optical filter according to any preceding claim in which the plurality of layers form a stack of layers in which successive layers are arranged in a periodically repeating order across the depth of the stack.

13. An optical filter according to any preceding claim wherein the filter is arranged to substantially reflect at least Infra-Red radiation and to transmit optical radiation at least in the visible optical spectrum.

14. An optical filter according to Claim 13 wherein the filter is arranged to substantially reflect at least Infra-Red radiation and Ultra-violet radiation.

15. A cover for a photovoltaic cell comprising a filter according to any preceding claim.

16. A photovoltaic cell comprising a cover according to Claim 15.

17. A photovoltaic cell according to Claim 16 wherein the photovoltaic cell is a solar cell.

18. A method of producing an optical filter for use with a photovoltaic cell, the method including:

providing a substrate;

stacking a plurality of layers of materials upon the substrate each of which layers is formed from one or both of:

a first material having a first index of refraction; and,

a second material having a second index of refraction being less than the first index of refraction;

including forming a first layer and a second layer of the plurality of layers, and forming from the first material a third layer of the plurality of layers being stacked between said first and second layers, wherein the optical thickness of each of said first and second layers is greater than the optical thickness of said third layer,

characterized in that it includes

forming the first layer and second layer from an inhomogeneous mixture of the first material and the second material, and wherein said first layer and said second layer are each formed with an optical thickness which differs in magnitude from the value 2Q by less than Q/2, and said third layer is formed with an optical thickness which differs in magnitude

from the value Q by less than Q/2, where Q is the thickness of a given said layer traversed by substantially one quarter of a wavelength of optical radiation of a common reference wavelength at which said optical thicknesses are determined, and wherein the first and/or second layer is formed such that all variations in the index of refraction of the first and/or second layer increase that index of refraction as the depth of the respective layer increases from regions thereof remote from said third layer to regions thereof proximate the third layer.

19. A method of producing an optical filter according to Claim 18 wherein the optical thickness of said first layer is formed to be substantially equal to the optical thickness of said second layer and vice versa.

20. A method of producing an optical filter according to Claim 18 wherein said first layer and said second layer are each formed to have an optical thickness substantially equal to 2Q, and said third layer is formed to have an optical thickness substantially equal to Q.

21. A method of producing an optical filter according to any of claims 18 to 20 further including the step of forming a pair of outer layers of the plurality of layers each being formed from said second material and between which are stacked said first, second and third layers.

22. A method of producing an optical filter according to Claim 21 wherein said pair of outer layers are formed such that the optical thickness of each differs in value from the magnitude Q by less than Q/2.

23. A method of producing an optical filter according to Claim 21 or Claim 22 wherein each of said pair of outer layers is formed such that any one such layer has an optical thickness substantially equal to that of the other such layer.

24. A method of producing an optical filter according to Claim 23 wherein each layer of the pair of outer layers is formed with an optical thickness substantially equal to Q.

25. A method of producing an optical filter according to any of claims 18 to Claim 24 wherein the first

and/or second layer is formed such that the index of refraction thereof varies continuously through at least a part of the depth of the respective layer.

26. A method of producing an optical filter according to Claim 25, wherein the first and/or second layer is formed such that index of refraction thereof varies substantially in a step-wise manner through at least a part of the depth of the respective layer.

27. A method of producing an optical filter according to any of preceding claims 18 to 24 and 26 wherein the first and/or second layer is formed such that all variations in the index of refraction thereof occur substantially in a step-wise manner.

28. A method of producing an optical filter according to Claim 26 or Claim 27 wherein the first and/or second layer is formed to comprise a plurality of sub-regions stacked therein each of which is formed from a homogeneous mixture of the first material and the second material whereby the homogeneous mixture forming any one sub-region differs from the homogeneous mixture forming immediately neighbouring sub-region(s) within the first and/or second layer such that the index of refraction of each of the

plurality of sub-regions is substantially constant with the depth of the sub-regions and the index of refraction of the first and/or second layer varies substantially step-wise with depth between successive sub-regions thereof.

29. A method of producing an optical filter according to any of preceding claims 18 to 28 wherein the method includes forming the plurality of layers into a stack of layers in which successive layers are arranged in a periodically repeating order across the depth of the stack.

30. A method of producing an optical filter according to any of preceding claims 18 to 29 wherein the plurality of layers are arranged to substantially reflect at least Infra-Red radiation and to transmit optical radiation at least in the visible optical spectrum.

31. A method of producing an optical filter according to Claim 30 wherein the plurality of layers are arranged to substantially reflect at least Infra-Red radiation and Ultra-violet radiation.

32. A method of optical filtering of radiation incident thereof upon a photovoltaic cell, the method including;

producing an optical filter according to any of preceding claims 18 to 31; and,

permitting incident radiation to pass through the plurality of layers so formed.

33. A method of producing an optical filter according to any of claims 18 to 31 including varying the optical thickness of one, some or all of the layers in said plurality of layers for the purpose of optimising the spectral response of the optical filter for: transmitting solar radiation within a band of wavelengths to which a solar cell is operatively designed to be sensitive to; and, for reflecting solar radiation outwith said band.